

CLAIMS

1. A device for exchange and/or reaction between at least two fluids, characterized in that it comprises at least a first spacer (1;21;41;61), of a selected thickness and including side walls defining a first chamber (2;22;45;62) fitted with a centre part at least partly recessed for the flow of a first fluid, and at least one second chamber (6;28;46;66) for the flow of a second fluid, the said first and second chambers being separated by a first exchange wall (11;26;42;64) suitable for an exchange and/or a reaction between fluids, of the thermal type and/or by mass transfer.

2. A device according to claim 1, characterized in that a first side wall (26;42) of the first spacer (21;41) is closed so as to form the said first exchange wall and present an outer face adapted to cooperate with a plate (32;53) so as to jointly define the said second chamber (28;46), said first spacer, or said first spacer and said plate, defining a modular processing block (Bi).

3. A device according to claim 2, characterized in that it comprises at least two blocks (Bi) the first spacer of which (21) comprises a second opened side wall (27), parallel or inclined related to the first closed side wall (26), and arranged to be closed by a plate (32) of another block.

4. A device according to claim 2, characterized in that it comprises another first spacer (41) the outer face of the first exchange wall (42) of which is destined to be tightly sealed by the said plate (53) so as to define another second chamber (46), the said first spacers (41) and the said plate (53) defining a modular processing overblock.

5. A device according to claim 1, characterized in that it comprises at least two first spacers (41) having at least one first closed side wall (42) so as to form a first exchange wall adapted to define with another first exchange wall (42) a second

chamber (46), the said first spacers so defining a modular processing block.

6. A device according to claim 5, characterised in that it comprises at least two blocks (Bi) the first spacers (41) of which each comprises a second side wall (43) placed opposite a first side wall (42) and closed so as to form a second exchange wall, each second exchange wall (42) being adapted to define with another second exchange wall (42) another second chamber (46).

7. A device according to one of the claims 5 and 6, characterized in that it comprises a diaphragm inserted between two successive first spacers to subdivide the second chamber into two parts, the said diaphragm forming the exchange wall.

8. A device according to claim 1, characterized in that the first spacer (61) comprises a first opened side wall, and in that it comprises at least a first (64) and a second (65) plates arranged to jointly define the said second chamber (66), the first plate (64) being additionally destined to close the said first opened side wall by forming the said first exchange wall, and the said first spacer (61) and the said first (64) and second (65) plates so defining a modular processing block (Bi).

9. A device according to claim 8, characterized in that it comprises at least two blocks (Bi) the first spacers (61) of which each comprises a second opened side wall, placed opposite a first opened side wall, and suitable to be tightly closed by a second plate (65) of another block.

10. A device according to one of the claims 1 to 9, characterized in that the first exchange wall (11) is a diaphragm.

11. A device according to claim 1, characterized in that it comprises a second spacer (7) of a selected thickness and including side walls defining the said second chamber (6), at least partly recessed for the flow of a second fluid, the said first (1) and second (7) spacers having a first opened side wall (12), the said first opened walls of the first and second spacers

being destined to be placed one facing the other by inserting a separation diaphragm or a plate (11) forming the said first exchange wall, and the said first (1) and second (7) spacers and the said diaphragm or plate (11) defining a modular processing
5 block (Bi).

12. A device according to claim 11, characterized in that it comprises at least two blocks (Bi) the first spacers (1) of which each comprises a second opened side wall, placed opposite a first side wall (12), and suitable to be placed opposite a second
10 side wall of another block by inserting another diaphragm or a plate.

13. A device according to one of the claims 2 to 12, characterised in that at least some of the plates (11;32;53;64,65) forming an exchange wall are fitted with fluid
15 disturbing devices.

14. A device according to claim 13, characterized in that at least some of the disturbing devices are plate surface deformations.

15. A device according to one of the claims 13 and 14, characterised in that at least some of the disturbing devices are
20 elements inserted on the plate.

16. A device according to one of the claims 1 to 15, characterized in that at least some of the first spacers comprise a wall (110) destined to subdivide their first chamber into two
25 parts.

17. A device according to one of the claims 1 to 16, characterised in that at least one of the spacers includes means of injection (100-103) arranged to inject at least a third fluid into the chamber of the said spacer.

30 18. A device according to one of the claims 1 to 17, characterized in that at least one of the spacers comprises three upper apertures and three lower apertures for supplying three fluids, and a collection of the said three fluids.

19. A device according to one of the claims 1 to 18, characterized in that at least one of the spacers includes one inserted element (14) selected from a group comprising a processing material, a vortex generator, a fluid flow guide and a stirrer.

20. A device according to claim 19, characterised in that the processing material is a metallic foam.

21. A device according to one of the claims 19 and 20, characterized in that the processing material is selected from a catalytic foam and a catalytic liner.

22. A device according to one of the claims 1 to 21, characterized in that at least one of the spacers (61) is constituted of the assembly of at least two sub-spacers (61 a, 61 b).

23. A device according to one of the claims 2 to 22, characterized in that it includes at least two blocks (Bi) or modular parallel overblocks, serially mounted so that an outlet of a first chamber of one of the blocks supplies with a first fluid the inlet of a first chamber of another block or overblock and that an outlet of a second chamber of one of the blocks or overblocks supplies with a second fluid an inlet of a first chamber of another block or overblock.

24. A device according to one of the claims 2 to 23, characterized in that it comprises at least two blocks (Bi) or modular overblocks, the chambers of which comprise at least one first inlet and one outlet, and the said blocks or overblocks being mounted in parallel so that all the first inlets are jointly supplied with a first fluid by a distributor and all the outlets supply a manifold.

25. A device according to one of the claims 1 to 24, characterised in that the said second fluid is a heat conductor fluid or a secondary refrigerant fluid.

26. An application of the device according to one of the previous claims to thermal and/or chemical processing of a first food or chemical fluid.

27. An application of the device according to one of the
5 claims 1 to 25 for the separation of the components of a first complex fluid.